

Amended claims

[The amendment was received on February 22, 1999, by the International Bureau. The original claims 1 to 19 were replaced with the amended claims 1 to 19.]

1. (Amended) An image coding device comprising:
 - a tile decomposition portion for decomposing image data into tiles each of N pixels x M pixels and outputting the N pixels x M pixels in the tile as an objective data to be coded for a corresponding each of the tiles;
 - a wavelet coding portion for extrapolating a predetermined data at the neighboring of the objective data input from the tile decomposition portion, decomposing each of the tiles into subbands and performing separate wavelet-encoding of each of the tiles;
 - a management information generating portion for generating management information necessary for independently decoding coded data of the subbands from the wavelet-coding portion on a tile-by-tile basis as well as on the subband-by-subband basis; and
 - a coded data integrating portion for attaching the management information to coded data.

2. (Amended) An image coding device as defined in claim 1, wherein the tile decomposition portion composes original image data into tiles each of the N pixels x M pixels and outputting, as the objective data to be coded corresponding

to said each of the tiles, a result of multiplying each of the tiles and neighboring pixel data by a predetermined two-dimensional window function.

3. (Amended) An image coding device comprising:

a tile decomposition portion for decomposing image data into tiles each of N pixels x M pixels and outputting the N x M pixels in the tile as an objective data to be coded for a corresponding each of the tiles;

a adjacent pixel adding portion for providing an objective tile to be coded with adjacent pixels necessary for wavelet transformation of the objective tile to be coded when such pixels exist at the neighboring thereof;

a wavelet coding portion for extrapolating a predetermined data when no pixel existing at the neighboring of the objective tile to be coded, decomposing each of the tiles into subbands and outputs only wavelet coefficients of the objective tile;

a management information generating portion for generating management information necessary for independently decoding coded data outputted from the wavelet coding portion on a tile-by-tile basis as well as on a subband-by-subband basis; and

a coded data integrating portion for attaching the management information to coded data.

4. (Amended) An image coding device as defined in claim 3, wherein the each adjacent pixel to be attached to the objective tile is multiplied by a weighting function according

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to a distance from the objective tile, when each of the objective tiles is attached the adjacent pixel by the adjacent pixel adding portion.

5. (Amended) An image coding device comprising:

a wavelet coding portion for decomposing an image into subbands by extrapolating a predetermined data at the neighboring of the image, and performing wavelet encoding of the subbands;

a tile composing portion for reconstructing, from wavelet coefficient inputted from the wavelet coding portion, tiles each of $N \times M$ wavelet coefficients spatially responding to respective tiles to be entropy coded;

a management information generating portion for generating management information necessary for independently decoding coded data outputted from the wavelet coding portion on a tile-by-tile basis as well as on a subband-by-subband basis; and

a coded data integrating portion for attaching the management information to the coded data.

6. (Amended) An image coding device as defined in any of claims 1 to 4, wherein the wavelet coding portion is provided with a memory necessary for storing at least data for the tile.

7. (Amended) An image coding device as defined in any of A claims 1 to 6, wherein the wavelet coding portion performs multiple times the subband decomposition process by selectively applying suitable filters for respective

subbands.

8. An image coding device having a combination of plural ^s coding modes selectable from claims 1 to ~~7~~ and having a plurality of selectively applicable coding modes, which further includes a flag generator for generating flags indicating respective coding modes and a control portion for controlling the coding device in a mode specified by the flag generated by the flag generating portion, wherein the management information generating portion generates management information including the flags generated by the flag generating portion.

9. (Amended) An image coding device as defined in any of ^s claims 1 to ~~8~~, wherein an ID generating portion for generating IDs for identifying respective tiles is further provided and the management information generating portion generates management information including the IDs generated by the ID generating portion.

10. (Amended) An image coding device as defined in any of ^s claims 1 to ~~8~~, which further includes an ID generating portion for generating IDs for identifying respective tiles and a adjacent tile ID deciding portion for generating IDs of adjacent tiles around an objective tile to be coded by using ID information from the ID generating portion and tile information from the wavelet coding portion, wherein the management information generating portion generates management information including the IDs and the IDs of

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adjacent tile.

11. (Amended) An image decoding device for receiving, at its input, coded information including: coded data of image data divided into tiles each containing N pixels x M pixels and separately wavelet-encoded; and management information for managing and identifying subbands generated by wavelet-encoding of the tiles and for selectively decoding an coded image corresponding to a necessary tile and subbands, comprising:

a management information separating portion for separating management information from an input coded data;

a coded data extracting portion for extracting coded data part corresponding to an objective tile and subbands according to the management information;

a wavelet decoding portion for performing wavelet decoding of the coded data extracted by the coded data extracting portion; and

a tile-combining portion for combining images decoded on a tile-by-tile basis into a desired decoded image.

12. (Amended) An image decoding device for receiving at its input a bit stream of coded information including: coded information of image data divided into tiles each containing N pixels x M pixels and separately wavelet-encoded after multiplying each tile data plus adjacent pixel data by a specified two-dimensional window function; tile-position information for specifying a location of each of the tiles in

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the coded information bit-stream; and management information for managing and identifying subbands generated when wavelet-encoding of the tiles, and for decoding an coded image corresponding to a necessary tile and subbands, comprising:

a management information separating portion for separating management information from the input bit stream;

a coded data extracting portion for extracting coded data part corresponding to an objective tile and subbands according to the management information;

a wavelet decoding portion for conducting wavelet-decoding of the coded data extracted by the coded data extracting portion; and

a tile integrating portion for arranging wavelet decoded data at respective places on an original image and superposing image values at overlaps of neighboring tiles to integrate the tiles into a desired decoded image.

13. (Amended) An image decoding device for receiving, at its input, coded information including: coded information of image data divided into tiles, each of the tiles containing N pixels \times M pixels and separately wavelet-encoded after attaching thereto adjacent pixels necessary for wavelet-transforming said tile when such pixels existing at the neighboring thereof; and management information necessary for decoding each tile and each subband; and for (selectively) decoding an coded image corresponding to a necessary tile and subbands, comprising:

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a management information separating portion for separating management information from the input bit stream;

a coded data extracting portion for extracting coded data part corresponding to an objective tile, tiles existing around the objective tile and subbands according to the management information;

a wavelet decoding portion for conducting wavelet-decoding of the coded data extracted by the coded data extracting portion; and

a tile integrating portion for arranging wavelet-decoded data at respective places on an original image and superposing image values at overlaps of neighboring tiles to integrate the tiles into a desired decoded image.

14. (Amended) An image decoding device for receiving input coded information including: coded information of an entropy-transformed into groups each of N wavelet coefficients $\times M$ wavelet coefficients spatially corresponding to a tile and entropy-encoded on a tile-by-tile basis; and management information for managing and identifying subbands generated when wavelet-encoding of the tiles, and for decoding an coded image corresponding to a necessary tile and subbands, comprising:

a management information separating portion for separating management information from the input bit stream;

a coded data extracting portion for extracting coded data part corresponding to an objective tile and subbands according

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to the management information;

a wavelet decoding portion for conducting wavelet-decoding of the coded information extracted by the coded data extracting portion; and

a wavelet-coefficient rearranging portion for rearranging the wavelet-coefficients arranged per tile in the wavelet decoding portion to the initial order image divided into subbands, said subbands wavelet- before decomposition into tiles.

15. (Amended) An image decoding device as defined in any of claims 11 to 14, wherein the wavelet decoding portion includes a memory for storing data at least for the tile.

16. (Amended) An image decoding device as defined in any ¹⁴ A of claims 11 to ¹⁴ ~~15~~, wherein the wavelet decoding portion repeats multiple times the subband composition with use of filters changeable every iteration.

17. (Amended) An image decoding device having a combination ¹⁴ A of plural decoding systems selectable from claims 11 to ¹⁴ ~~16~~ and having plural decoding modes selectively applicable, which further includes:

a management information separating portion for separating management information necessary for decoding each tile and each subband from the input coded data;

a flag extracting portion for extracting from the management information a flag for specifying a decoding mode used for decoding the coded data from the management

information; and

a control portion for controlling the decoding device to be activated in a decoding mode corresponding to the extracted flag.

18. (Amended) An image decoding device as defined in any of claims 11 to ¹⁴ 17, which further includes a control portion for controlling inputting of coded data to the wavelet decoding portion according to ID information so as to decode only a tile having a specified ID by the wavelet decoding portion.

19. (Amended) An image decoding device as defined in any of claims 11 to ¹⁴ 17, which further includes a buffer memory for storing input coded data and a control portion for controlling the data from the buffer according to ID information and adjacent tile ID information in management information from the management information separating portion so that coded data only for an objective tile having a specified ID and related adjacent tiles having respective IDs is outputted from the buffer memory and inputted to the wavelet coding portion to decode only the specified tile and the adjacent tiles.

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